

NEUROPTEROID INSECTS OF THE PHILIPPINE ISLANDS

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TWO PLATES

A few years ago not a dozen species of neuropteroid insects were known from the Philippines. A few were collected by Semper and described by Brauer, and Navas and Weele have added two or three.

In the past few years Prof. Charles Fuller Baker has sent me specimens representing about seventy-five species of insects of these orders. In a preliminary report¹ I described a number of new species and recorded others. Professor Baker has desired that a synopsis be published in the Philippines to encourage local students, and the following is presented, although I recognize that it does not cover one third, probably not one fifth, of the species to be found in the Philippines. Nearly all the material is from Los Baños, Laguna Province, Luzon, or from near-by territory.

In the generic tables I have included some genera not yet recorded from the Philippine Islands, which from their known distribution may be expected to occur there, but doubtless unexpected as well as new genera will be found in future collections.

The Odonata, or dragon flies, are not included in this paper. The only island in Insulinde whose neuropteroid fauna is at all well known is Java. It differs from that of the Philippines in the presence of Megaloptera and Mecoptera, and even if these

¹ *Proc. Ent. Soc. Washington* (1913), 15, 170-180.

are later discovered in the Philippines, they certainly are not as common as in Java. The species known also from Java are such as are also known from Celebes, or generally distributed in Malasia. There is nothing to indicate any relation to the true Australian fauna; in fact, nearly all the genera are well known in India or southeastern Asia. There is no trace of the genera that ally India and Ceylon to Africa. Many of the psocid genera are known also from Borneo.

Key to the orders.

- a*¹. Wings with a nodus, or strong cross vein near middle of costa, interrupting the venation; wings densely net-veined; no palpi, antennæ very small..... Odonata.
- a*². No nodus present.
 - b*¹. Tarsi five-jointed.
 - c*¹. Hind wings with a folded anal area; antennæ never capitate.
 - d*¹. Mandibles and maxillæ imperfect; wings with few cross veins; pronotum small; wings plainly hairy..... Trichoptera.
 - d*². Mandibles and maxillæ developed; wings not hairy and with many cross veins; pronotum prominent..... Megaloptera.
 - c*². Hind wings without a folded anal area; wings not noticeably hairy; mouth parts well developed.
 - e*¹. Head prolonged in beak beneath; pronotum small; wings with few cross veins..... Mecoptera.
 - e*². Head not so prolonged; pronotum distinct; usually many cross veins in wings..... Neuroptera.
 - b*². Tarsi with fewer than five joints.
 - f*¹. Antennæ minute; abdomen with long terminal setæ; fore wings much larger than hind wings..... Anisoptera.
 - f*². Antennæ long.
 - g*¹. Tarsi with four joints; only costal venation distinct, setæ very short Isoptera.
 - g*². Tarsi two- or three-jointed; venation developed all over wing.
 - h*¹. No terminal setæ; pronotum small; wings with few veins; no folded anal area to hind wings..... Corrodentia.
 - h*². With terminal setæ to abdomen; pronotum distinct; a folded anal area to hind wings..... Plecoptera.

ISOPTERA

Key to the families.

- a*¹. Tarsi of three joints, basal joint of front tarsi swollen; pronotum with a transverse suture..... Embidæ.
- a*². Tarsi of four joints, basal joint not swollen; no transverse suture to pronotum Termitidæ.

TERMITIDÆ

Several species of white ants have been recorded from the Islands, and doubtless twenty or thirty occur; the only one received is a large dark-winged male *Termes*. Six new species

of Philippine termites collected by Baker, and one new species collected in Manila by Mr. P. Kanehira, government forester of Formosa, have been described by Oshima.²

EMBIIDÆ

Oligotoma saundersi Westwood.

The only species of this family so far received is *Oligotoma saundersi* Westwood. Two specimens from Mount Maquiling, Luzon. It is a brownish species with pale streaks in the wings. It is widely distributed and extends to India, Africa, and Australia.

CORRODENTIA

This order includes the family Psocidæ, or bark lice. Numerous genera have been described or recorded from the Malay region by Enderlein. Those known from the Islands may be tabulated as follows:

PSOCIDÆ

Key to the genera.

- a*¹. Wings more or less net-veined beyond the middle; head very broad.
Calopsocus.
- a*¹. Wings not net-veined.
 - b*¹. Wings acute at tips and clothed with scalelike hairs.... Amphientomum.
 - b*². Wings without scalelike hairs.
 - c*¹. A closed discal cell.
 - d*¹. Stigma very long and slender..... Tæniostigma.
 - d*². Stigma normal.
 - e*¹. Tarsi three-jointed; wings more or less densely dotted with brown Myopsocus.
 - e*². Tarsi two-jointed; wings not dotted with brown.
 - f*¹. Radius and median united for at least one point..... Psocus.
 - f*². Radius and median not united; connected by a cross vein.
Amphigerontia.
 - c*². No closed discal cell.
 - g*¹. Stigma with a short spur behind..... Amphipsocus.
 - g*². Stigma without a spur.
 - h*¹. Radius and median vein not united, but connected by a cross vein; stigma and areola postica elongate..... Epipsocus.
 - h*². Radius and median united at least at one point.
 - i*¹. Stigma very long, like *Tæniostigma*..... Tagalopsocus.
 - i*². Stigma of moderate length.
 - j*¹. Areola postica very high..... Kolbea.
 - j*². Areola postica moderate.
 - k*¹. Basal joints of antennæ elongate and enlarged; venation aberrant Dyspocus.
 - k*². Basal joints of antennæ neither elongate nor enlarged.
Cæcilius.

² *Annot. Zool. Japon.* (1914), 8.

Calopsocus rizali sp. nov. Plate I, figs. 1 and 2.

Yellowish; antennæ blackish, except basal joints pale, tips of palpi black; thorax unspotted; legs pale, tibiæ infuscated or nearly black. Wings uniform pale brown; venation irregular, usually the radius is not as evenly three-branched as in the figure. Venation of hind wings much like that of *C. infelix*, but the upper fork much shorter than the lower one. Antennæ with long hairs on basal parts; head broad, the vertex with a deep median indentation, the lobes higher than the eyes. Wings longer than in *C. infelix*; the area beyond the stigma bent downward.

Length to tip of wings, 4.3 millimeters.

LUZON, Tayabas, Malinao (*Baker*).

Genus *PSOCUS* Linnæus

Key to the species.

α^1 . Stigma angulate behind; second and third posterior cells mostly pale.

α^1 . Stigma rounded behind, second and third posterior cells mostly dark.

bakeri.
taprobanes var. *luzonensis*.

Psocus bakeri Banks.

Numerous specimens from Los Baños.

Psocus taprobanes var. *luzonensis* var. nov.

Agrees very closely with Enderlein's figure of variety *bengalensis*, but the fork of the radius contains only three dark dots, the basal band extends up to the radius, a pale spot at base of second posterior cell only, the white marginal spots cover the marginal vein, and between them the margin is much darker than elsewhere. The stigma is broader than he figures, but not quite angulate behind; the radial fork is much longer than he figures, being fully as far basal as the first fork of the median vein, and its pedicel is not as long as the outer side of discal cell. Head pale; nasus faintly lineate; thorax pale; all tarsi black on last joint and dark at tip of tibia. et

Length to tip of wings, 6 millimeters.

LUZON, Laguna, Mount Maquiling (*Baker*).

True *P. taprobanes* is found in Java, Ceylon, and doubtless in other islands.

Amphigerontia sp.

A black-winged specimen of this genus from Mount Banahao is in too poor condition for description.

Genus **MYOPSOCUS** Hagerdorn

Key to the species.

- α^1 . Stigma twice as long as broad, angulate behind; larger species. enderleini.
 α^2 . Stigma not twice as long as broad; smaller species..... bakeri.

Myopsocus enderleini Banks.

Several specimens from Los Baños, Luzon, and Puerto Princesa, Palawan.

Myopsocus bakeri sp. nov. Plate I, fig. 3.

Pale yellowish, lateral lobes of mesonotum with several small dark spots; legs dark at tips of the tibiae. Wings brown, mostly pale brown on basal half, and mostly darker brown on the apical half; an oblique apical brown band over the posterior cells, its inner edge marked by three pairs of black dots; stigma mostly brown, blackish near base; areola postica brown, a blackish mark at upper side near the median; a broad, oblique, brown band across basal part of wing, its edges with a few black dots; dark clouds elsewhere on wing, so that only small spaces are pale; the brown guttated in appearance, the margin of wing alternately brown and hyaline. The wing seen from side view is strongly undulate on upper (hind) margin. Hind wing slightly darkened at tip, venation dark; upper branch of fork reaching nearly to tip of wing.

Length to tip of wings, 4 millimeters.

LUZON, Laguna, Mount Maquiling (*Baker*).

Tæniostigma bimaculata Banks.

From Los Baños and Mount Maquiling, Luzon, and Puerto Princesa, Palawan.

Genus **EPIPSOCUS** Hagerdorn

Key to the species.

- α^1 . Wings unmarked inornatus.
 α^2 . Wings with several brown clouds..... completus.

Epipsocus inornatus sp. nov. Plate I, fig. 4.

Body, legs, and antennae pale yellowish; wings also faintly, uniformly yellowish and with a uniform yellowish venation, no dots on the veins, nor any marks on the wings; fore wings very long and slender, more so than in *E. marginatus* Enderl., barely wider in stigmal area; pterostigma long and slender and tapering

toward tip; areola postica long and tapering toward tip; forking of radial vein but little beyond the first forking of median vein; cross vein between radius and medius oblique and fully as long as width of the stigma.

Length to tip of wings, 3.8 millimeters.

LUZON, Laguna, Mount Maquiling (*Baker*). Two specimens.

Epipsocus completus sp. nov. Plate I, fig. 5.

Yellowish, nasus rather darker; head narrow, eyes rather large; antennæ yellowish; thorax unspotted; legs pale. Wings hyaline, marked with brown; a broad band before middle, one at about middle across stigma rather obliquely to the areola postica, its outer margin distinct; areola postica mostly dark, and thence along outer margin a broad dark area, leaving a pale spot in base of second median fork; the radial fork with only a band across it and a dot at base. Stigma long; areola postica long. In hind wings the upper branch of first fork a long distance before tip, but oblique.

Length to tip of wings, 3.8 millimeters.

LUZON, Laguna, Mount Maquiling (*Baker*). Apparently related to *E. marginatus* Enderlein, but the markings more extensive, and the venation of the hind wing different.

Genus **AMPHISOCUS** McLachlan

Key to the species.

- α^1 . Radius and median united at one point; wings clear..... unitus.
 α^2 . Radius and median not united, but connected by a cross vein; wings smoky connexus.

Amphisocus connexus sp. nov. Plate I, fig. 6.

Clypeus, nasus, and vertex black, sides of face pale; antennæ black, basal joints pale; thorax almost entirely black above, pleura pale; legs pale, tibiæ blackish. Wings smoky, venation blackish, stigma red, and the red extending back over the spur. Wings not very long; stigma large, angulate, and with a long spur behind; median and radius connected by a cross vein, not united; radial fork about one-half way between the forks of the median; areola postica subtriangular and moderately high. In hind wings the upper branch of the first fork ends near tip of the wing. Eyes small, but near to the top of the vertex.

Length to tip of wings, 4 millimeters.

MINDANAO, Butuan (*Baker*).

Amphipsocus unitus sp. nov. Plate I, fig. 7.

Pale yellowish, ocelli on a black dot; antennæ pale, legs very pale. Wings hyaline; stigma pink; venation yellowish, basal part of radius to the median vein dark. Stigma large, angulate behind and with a minute spur; radius and median united at one point; fork of radius nearer to the first than to the second fork of the median; areola postica nearly as high as long. In hind wings the upper branch of the first fork reaches to near the tip of the wing. Eyes small, not nearly as high up as the vertex.

Length to tip of wings, 4.6 millimeters.

LUZON, Laguna, Mount Maquiling (*Baker*).

Genus TAGALOPSOCUS novum

Related to *Cæcilius*, but distinguished by the long stigma, very similar in this respect to *Tæniostigma*; venation with very short bristles. In hind wings the first fork has its upper side nearly to tip of wing, not directed upward. Tarsi two-jointed.

Tagalopsocus luzonensis sp. nov. Plate I, figs. 9 and 10.

Black; two large pale spots on front between antennæ, separated by a narrow black line; vertex pale on each side; antennæ wholly pale; pubescence rather short. Thorax jet black, leaving only a pale median depressed spot. Legs very pale yellowish, almost white. Wings hyaline, long, almost acute at tips; stigma reddish, very long and slender; venation yellowish, some veins near the tip darker; median and radius united at one point; radial fork opposite first fork of the median, areola postica rather high, but evenly rounded.

Length to tip of wings, 6.2 millimeters.

LUZON, Laguna, Mount Maquiling (*Baker*).

Kolbea bakeri sp. nov. Plate I, fig. 8.

Pale yellowish; clypeus large, blackish; nasus dull black, with a narrow median black stripe running up on the vertex; eyes very small; antennæ blackish, the basal joints yellowish; mesonotum with three black patches, one in front and one on each side; legs yellowish, the tibiæ, especially the hind tibiæ, dark. Wings hyaline; stigma reddish; venation dark; veins with rather short bristles; stigma rounded behind; radius and median vein united at one point; areola postica very high.

Length to tip of wings, 4.1 millimeters.

LUZON, Laguna, Mount Maquiling (*Baker*).

In appearance this species is very similar to *Amphipsocus unitus*, but the latter has no distinct marks on head, and the stigma has the posterior spur.

Genus *CÆCILIUS* Curtis

Key to the species.

- a*¹. Veins with dark dots and several brown clouds..... *guttulatus*.
*a*². Veins without dark dots.
*b*¹. Radial fork arises before first fork of the cubitus; faint dark marks at stigma and ends of veins..... *inæqualis*.
*b*². Radial fork arises beyond first fork of the cubitus; wing unmarked *castellus*.

Cæcilius castellus sp. nov. Plate II, fig. 11.

Pale yellow; mid lobe of mesonotum brown; legs and antennæ very pale. Wings long and slender, faintly yellowish, more distinctly so in costal half; venation pale, but apical forks dark; stigma long and slender; radius and median united at one point, fork of radius about halfway between the forks of the median; areola postica very small and much longer than high. In hind wings upper branch of the fork vertical to the anterior margin and nearer to the other fork than to the tip of the wing.

Length to tip of wings, 2.8 millimeters.

LUZON, Laguna, Los Baños (*Baker*). Two specimens.

Cæcilius guttulatus sp. nov. Plate II, fig. 12.

Grayish; nasus faintly lineate with reddish; vertex with four reddish spots; antennæ rather dark, the short joints beyond middle dark, but with snow-white apices; thorax with several rufous spots; legs pale, tibiæ with dark tips, tarsi dark. Wings hyaline, rather short; venation as figured; venation pale, with prominent dark dots on all except anal vein; dark clouds at ends of veins; stigma short, rather suddenly truncate, mostly occupied by dark clouds, one of them continued back to radial sector, and another above areola postica; a small dark cloud above cubitus, and two others toward base of wings. Hind wings hyaline, with brown venation. Head broad; eyes small.

Length to tip of wings, 2.9 millimeters.

LUZON, Laguna, Mount Maquilang (*Baker*).

Cæcilius inæqualis sp. nov. Plate II, fig. 13.

Pale yellowish; basal joints of antennæ reddish. Wings hyaline, venation pale, but dark and with a narrow dark margin near tip, an apical brown cloud in the stigma, and a spot at end of anal vein. Wings rather slender; stigma long, slender,

evenly rounded behind; radius and median united for a short distance; the radius forks a little before the first fork of the median, the forks of the latter being unusually short; areola postica long, highest toward base. In hind wing the upper branch of the first fork is a long distance from tip and vertical.

Length to tip of wings, 2.3 millimeters.

LUZON, Laguna, Mount Maquiling (*Baker*). This species is peculiar on account of the short median forks.

Dypsocus apicatus sp. nov. Plate II, figs. 14 and 15.

Black; antennæ from the fourth joint outward pale yellowish; fore wings a little pale at areola postica, elsewhere black, and through the middle area the surface transversely, rugosely waved; apical part and stigma swollen and polished; head and thorax with minute scattered whitish hairs; second joint of antennæ long, heavy, and plainly curved, longer than the third.

Length to tip of wings, 4 millimeters.

PALAWAN, Puerto Princesa (*Baker*). This species is related to *D. coleoptratus* Hag., but the proportions in the venation and basal joints of the antennæ are different.

PLECOPTERA

This order includes the Pelidæ, or stone flies; the species so far received all belong to *Neoperla*, or *Ochtepetina* as it is called by some authors.

Genus *NEOPERLA* Needham

Key to the species.

- α^1 . Cross vein up from radial sector to the radius extending obliquely backward obliquus.
 α^2 . This cross vein straight across.
 b^1 . Pale yellowish; ocelli of moderate size clarissa.
 b^2 . Brownish yellow; ocelli very large recta.

Neoperla obliquus Banks.

From Mount Maquiling and Los Baños. A large yellowish brown species, the legs and setæ pale yellow, the antennæ brown.

Neoperla recta Banks.

Numerous specimens from Mount Maquiling and Los Baños. In general appearance this species is very similar to *N. obliquus*.

Neoperla clarissa Banks.

Specimens from Mount Maquiling and Los Baños. A smaller and more yellow species than the others.

ANISOPTERA

The Ephemeridæ, or mayflies, are represented in the collection by only four or five specimens. Doubtless they are fairly numerous, as many are recorded from Java and other Malasian regions; therefore I have made a generic table for all genera likely to occur in the Philippines, as far as indicated by their known distribution.

Key to the genera.

- a¹. Vein 8 plainly forked, and with one (or more) longitudinal vein between the forks; mid and hind legs very short; eyes of male widely separated.
 - b¹. First vein ends near middle of costal margin; between vein 9 and its fork only one longitudinal vein; rather few cross veins.
 - Palingenia.
 - b². First vein runs out to near tip; between vein 9 and its fork are several longitudinal veins; many cross veins..... Polymitaecys.
- a². Vein 8 not plainly forked; if some of its branches appear as forks, then no longitudinal veins between forks.
 - c¹. Margin of wing (of adult) ciliate; only two wings; three setæ; eyes of male separated; no marginal intercalaries.
 - d¹. Costal and many discal cross veins..... Tricorythus.
 - d². No costals and few discal cross veins..... Cænis.
 - c². Margin of wing (of adult) not ciliate behind.
 - e¹. Hind wings absent or very slender (more than twice as long as broad, and with but two longitudinal veins; some marginal intercalaries; two setæ; eyes of male turbinate, approximate.
 - f¹. Hind wings present, marginal intercalaries in pairs..... Baetis.
 - f². Hind wings absent.
 - g¹. Marginal intercalaries in pairs..... Pseudocloeon.
 - g². Marginal intercalaries single..... Cloeon.
 - e². Hind wings present and broad.
 - h¹. Vein 9 much curved and ending in hind margin long before anal angle.
 - i¹. Three setæ, hind wings very small; few marginal intercalaries.
 - Thraululus.
 - i². Two setæ.
 - j¹. A large free space at base above vein 8..... Rhænanthus.
 - j². No such free space..... Chirotonetes.
 - h². Vein 9 little curved, nearly parallel to hind margin, and ends near anal angle; several longitudinal veins between 8 and 9.
 - k¹. Cross veins arranged in several series, leaving large free spaces.
 - Comproneuria.
 - k². Cross veins all over.
 - l¹. Hind tarsi twice as long as the tibiæ..... Atopopus.
 - l². Hind tarsi barely longer than hind tibiæ..... Thalerosphyrus.

Only three specimens have been received; these belong to the genera *Thraululus* and *Thalerosphyrus*; one of them appears to be *Thalerosphyrus torridus* Walker, described very briefly from the Philippines.

MEGALOPTERA

No species of this order has yet been recorded from the Islands, but probably one or more species of *Hermes* and *Chauliodes* will eventually be found, since they are known from several islands in Malasia.

NEUROPTERA

Key to the families.

- α^1 . Front legs enlarged, raptorial; ocelli present, pronotum long.
Mantispidæ.
- α^2 . Front legs not enlarged.
 - b^1 . Minute species, with farinose wings having few veins.
Coniopterygidæ.
 - b^2 . Moderate to large; wings not farinose.
 - c^1 . Antennæ short, enlarged at tip..... Myrmeleonidæ.
 - c^2 . Antennæ long.
 - d^1 . Antennæ capitate..... Ascalaphidæ.
 - d^2 . Antennæ not capitate.
 - e^1 . Greenish species; margin of wing without a dot between veins.
Chrysopidæ.
 - e^2 . More or less brownish; margin of wings with a dark dot or short line intercalate between ends of veins..... Hemerobiidæ.

HEMEROBIIDÆ

Key to the genera.

- α^1 . But one radial sector.
- α^2 . At least two radial sectors.
 - b^1 . Practically no cross veins beyond the middle of wings, small species.
Sisyræ.
 - b^2 . Many cross veins; ocelli present; both median and cubital veins forked near base..... Spilosmylus.
 - c^1 . Fore wings at base without a recurrent vein; two series of gradates.
Micromus.
 - c^2 . Fore wings broad at base and with a recurrent vein.
 - d^1 . Outer and inner gradates present..... Hemerobius.
 - d^2 . Only one series of gradates present.
 - e^1 . No outer series of gradates..... Notiobiella.
 - e^2 . No inner series of gradates..... Sympherobius.

Spilosmylus modestus Gerst.

One from Mount Maquiling. Previously known from Java.

Sisyræ bakeri Banks.

Several from Los Baños and Mount Maquiling. A small, shiny, brown-winged species.

Micromus pusillus Banks.

From Los Baños, Mount Maquiling, and Mount Banahao. Previously recorded from Java.

Notiobiella affinis Banks.

From Manila, Luzon, and Baguio, Benguet.

CHRYSOPIDÆ*Key to the genera.*

- a*¹. Third cubital cell not divided; between radial sector and median vein is a complete series of connecting veinlets forming a false vein and extending out to the gradates..... **Apochrysa**.
- a*². Third cubital cell divided; no such false vein.
 - b*¹. Third cubital cell divided longitudinally..... **Nothochrysa**.
 - b*². Third cubital cell divided obliquely, so that the divisory veinlet ends on the upper side of the cell.
 - c*¹. Costal area of fore wings very broad at base..... **Ancylopteryx**.
 - c*². Costal area of fore wings very narrow at base..... **Chrysopa**.

Apochrysa bellula Banks.

Only the type from Los Baños. A large, densely veined species, with a dark spot at the upper end of the inner gradate series in the fore wings.

Genus NOTHOCHRYSA McLachlan

The two Philippine species of this genus have the antennæ black, except the basal joints.

Key to the species.

- a*¹. Pronotum margined with dark; some cross veins in basal middle space of fore wings dark..... **evanescens**.
- a*². Pronotum not margined; cross veins pale..... **æqualis**.

Nothochrysa æqualis Walker.

Two from Los Baños.

Nothochrysa evanescens McLachlan.

One from Los Baños.

Genus CHRYSOPA Leach*Key to the species.*

- a*¹. Wings with some dark clouds..... **faceta**.
- a*². Wings without clouds.
 - b*¹. Second joint of antennæ dark, a dark median spot on face below antennæ **azygota**.
 - b*². Second joint of antennæ pale.
 - c*¹. Venation partly dark; gradates dark..... **ilota**.
 - c*². Venation, including gradates, pale.
 - d*¹. Gradates divergent; inner series at upper end very close to the radial sector..... **tagalica**.
 - d*². Gradates subparallel.

- e*¹. Inner gradates few (3 or 4), each much more than its length from the next one; divisory veinlet ends beyond the cross vein *isolata*.
*e*². Inner gradates (6 or 7) scarcely their length apart; divisory veinlet ends before the cross vein..... *morota*.

***Chrysopa faceta* Navas.**

Described from Luzon; I have one specimen from Mount Maquiling.

***Chrysopa isolata* Banks.**

Two from Mount Maquiling.

***Chrysopa morota* Banks.**

From Mount Maquiling and Los Baños.

***Chrysopa tagalica* Banks.**

Two from Los Baños.

***Chrysopa ilota* Banks.**

Two from Mount Maquiling.

***Chrysopa azygota* Banks.**

One from Mount Maquiling.

***Ancylopteryx 8-punctata* Fabricius.**

From Los Baños. The wings have several dark dots. Widely distributed in Malasia.

***Ancylopteryx doleschalli* Brauer.**

From Los Baños, Luzon, and Puerto Princesa, Palawan. With spots in wing much larger than in the other species. Known from Celebes and Amboina.

MANTISPIDÆ

Key to the genera and species.

- a*¹. Radial sector with at least ten or more branches; costal fourth of wings brown, large species..... *Euclimacia tagalensis* Banks.
*a*². Radial sector with from five to eight branches.
*b*¹. In hind wings the cubital vein connected to anal by a cross vein; a dark streak in tips of wings..... *Climaciella luzonica* Weele.
*b*². In hind wings the cubitus bent down to touch the anal vein; no dark streaks in tips of wing.
*c*¹. Femora and tibiæ with dark bands near the middle; stigma short, triangular *Mantispa manca* Gerst.
*c*². Femora and tibiæ without median bands; stigma normally elongate.
*d*¹. Antennæ with a pale annulus before tip.
Mantispa annulicornis Gerst.

*d*². Antennæ without a pale annulus toward tip.

*e*¹. Costa and radius pale yellow..... *Mantispa enderleini* Banks.

*e*². Costa and radius dark or black..... *Mantispa luzonensis* Navas.

Euclimacia tagalensis Banks.

One, the type, from Los Baños.

Climaciella luzonica Weele.

Several from Los Baños and Mount Banahao.

Mantispa manca Gerst.

Two from Mount Maquiling; widely distributed in Insulinde.

Mantispa annulicornis Gerst.

From Mount Maquiling and Mount Banahao; also known from various Malasian islands.

Mantispa luzonensis Navas.

Various specimens from Los Baños, Mount Maquiling, and Mount Banahao.

Mantispa enderleini Banks.

From Los Baños; Mount Maquiling; Butuan, Mindanao; and Puerto Princesa, Palawan.

ASCALAPHIDÆ

Key to the genera.

Three genera are known to occur in the Islands, and the distribution of *Hybris* is such that it may also be present.

*a*¹. Between cubitus and hind margin in hind wing not more than three rows of cells; veins beyond end of anal not plainly branches of cubitus.

*b*¹. Pterostigma short, about as high as long..... *Suhpalasca*.

*b*². Pterostigma plainly longer than high..... *Suphalomitus*.

*a*². Between cubitus and hind margin in hind wing more than three rows of cells; some veins beyond end of anal apparently branches of cubitus.

*c*¹. Wing tips acute; male appendages elongate..... *Hybris*.

*c*². Wing tips rounded; male appendages very short..... *Protacheron*.

Suhpalasca princeps Gerst.

One from Los Baños; described from Java. The tips of the wings are blackish.

Suphalomitus malayanus McLachlan

Recorded from Basilan (*Doherty coll.*). Wings hyaline, tips barely darker. Known also from Celebes and Java.

Protacheron philippinensis Weele.

Described from Florida Blanca Mountains, Luzon, and since recorded from Celebes and Java. The male with hyaline wings, in female the hind wings are dark near the outer hind margin.

MYRMELEONIDÆ

Key to the genera.

- a*¹. In fore wing the second and third anal veins are separate, but connected by a cross vein; a line in apex of the wing.
 - b*¹. Legs and spurs very long and slender; wings not excised nor sinuated on the outer margin; first tarsal joint about as long as the last. Dendroleon.
 - b*². Legs and spurs shorter; first tarsal joint shorter than the last; wings more or less excised on the outer margin..... Episalus.
- a*². In fore wing the second and third anal veins are united for at least one point.
 - c*¹. One cross vein before origin of radial sector in the hind wing.
 - d*¹. In fore wing the anal runs parallel to the cubitus for a long distance; first tarsal joint very long..... Protoplectron.
 - d*². Anal diverges from cubitus.
 - e*¹. Legs rather short and stout; spurs about equal to three or four tarsal joints..... Distoleon.
 - e*². Legs very slender; the tibia about as long as femur.
 - f*¹. Radial sector in fore wing arises much before the cubital fork; spurs as long as three or four joints..... Acratoleon.
 - f*². Radial sector arises much beyond the cubital fork; spurs shorter; claws very long..... Paraglenurus.
 - c*². Three or more cross veins before origin of radial sector in the hind wing.
 - g*¹. Legs short and stout; spurs bent; body very hairy.... Acanthaclisis.
 - g*². Legs more slender and less hairy; spurs only slightly curved.
 - h*¹. Wings very broad at stigma; a series of connecting veinlets before stigma in fore wing..... Hagenomyia.
 - h*². Wings more slender, no such series of connecting veinlets. Myrmeleon.

Dendroleon sanchezi Navas.

Described from Luzon, under the name *Delgadus*. I have not seen it.

Genus MYRMELEON Linnæus

The two species so far received may be distinguished as follows:

Key to the species.

- a*¹. Vertex all black..... celebesensis.
- a*². Vertex with two pale spots..... angustipennis.

Myrmeleon angustipennis sp. nov. Plate II, fig. 16. .

Practically only a form or variety of *M. tenuipennis* Rbr.,

but differs in that the dark stripe on the pronotum is as broad in front of the transverse groove as behind it.

Head mostly black; lower sides of face, clypeus, orbital line, and two submedian spots on the vertex pale yellowish; basal joint of antennæ also pale; spots on vertex sometimes connected. Pronotum with a broad dark median stripe, the anterior part as broad as the posterior, the anterior part with a pale median line. Legs mostly pale, hind femora with a preapical dark band. Abdomen dark, with pale pubescence. Wings hyaline, unmarked, venation pale, with minute dark dots; wings as slender as in *M. tenuipennis*, the tips acute; twelve branches to the radial sector; seven cross veins before radial sector in fore wing, four in the hind wing; in fore wing the radial sector arising just beyond the cubital fork; two cross veins between cubital fork and anal; one cross vein in hind wing; in the fore wing a few costals before the stigma forked.

Expanse, 52 millimeters.

LUZON, Laguna, Los Baños and Mount Maquiling (*Baker*). Very close to *M. tenuipennis*, which I have from northern India and Ceylon. *Myrmeleon freyeri* Navas is a synonym of *M. tenuipennis*.

Myrmeleon celebesensis McLachlan.

One from Mount Maquiling. *Myrmeleon capito* Navas from Borneo is the same species, and both are probably synonyms of *M. solers* Walker from China.

Genus **DISTOLEON** Banks

Distoleon will replace *Formicaleo* as used by most authors. *Formicaleo* was originally applied only to the type species of *Myrmeleon* and so is a synonym of it. *Formicaleon* Banks is a synonym of *Distoleon*.

Key to the species.

*a*¹. In fore wing the branches of cubitus bent to form a line.

*b*¹. The line only one row of cells behind the cubitus.....*disjunctus*.

*b*². The line three to five cells behind the cubitus..... *bakeri*.

*a*². In fore wing the branches, although somewhat bent, not forming a line *cleonice*.

Distoleon bakeri sp. nov. Plate II, fig. 17.

Face pale; dark spot between antennæ, reaching narrowly below and broadly above; vertex with an anterior, double curved dark band, and behind curved marks which inclose two pale submedian spots. Antennæ dark, with pale annuli. Pronotum dark, traces of a pale median line, and a curved pale mark each

side in front; median lobe of mesothorax with a median line and the hind border pale. Abdomen dark, with a pale median spot near middle of several segments. Legs rather dark, paler on base or above, spots and dots on the tibiæ, tarsal joints dark at tips. Wings hyaline, stigma and spot at end of cubitus dark, and in the fore wings a dark dot at end of anal. Venation dark, subcosta and radius with pale streaks, and some other veins with pale markings. Wings of moderate length, acute at tips; in fore wing a line between branches of cubitus but situated four or five cells behind the upper cubitus; in hind wing only two rows of cells behind the cubitus; in fore wing eight cross veins before the radial sector; latter with ten branches; in fore wings seven cross veins between anal and cubital fork, only one such cross vein in the hind wing.

Expanse, 54 millimeters.

PALAWAN, Puerto Princesa (*Baker*).

Distoleon cleonice Banks.

From Los Baños.

Distoleon disjunctus Banks.

From Los Baños and Mount Maquilang.

CONIOPTERYGIDÆ

No species of this family is yet recorded from the Philippine Islands.

MECOPTERA

No species of this order has been taken in the Philippine Islands.

TRICHOPTERA

Key to the families.

- α^1 . Palpi with the last joint slender, flexible, or multiarticulate.
 - b^1 . Not more than three apical forks in the fore wings; a few bristles on the thorax among the hairs..... *Leptoceridæ*
 - b^2 . Four or five apical forks in fore wings; no bristles on thoracic notum.
 - Hydropsychidæ*.
- α^2 . Palpi with last joint shorter, entire, not flexible.
 - c^1 . Minute species; wings slender and acute; hairs mostly erect; few veins in wings..... *Hydroptilidæ*.
 - c^2 . Size moderate; wings normal.
 - d^1 . Ocelli present..... *Chimarra*.
 - d^2 . Ocelli absent.
 - e^1 . A closed median cell behind the discal cell in the fore wings; fork 4 present..... *Calamoceratidæ*.
 - e^2 . No closed median cell; fork 4 absent..... *Sericostomatidæ*.

SERICOSTOMATIDÆ

Key to the genera.

- a*¹. Forks 1, 2, 3, 5 present in both wings; discal cell in hind wings open; male palpi not upcurved and heavily haired or scaled..... *Goera*.
*a*². Forks 1, 2, 3, 5 not all present in both wings; discal cell in hind wings open.
*b*¹. Fore wings very broad; basal joint of male antennæ without processes. *Neolepidostoma*.
*b*². Fore wings rather slender; basal joint of male antennæ with processes above *Dinarthodes*.

The above genera occur in Java, but none is yet recorded from the Philippines.

CALAMOCERATIDÆ

Key to the genera.

- a*¹. Radius in fore wing not running into the first apical sector. *Anisocentropus*.
*a*². Radius in fore wing running into the first apical sector, also in hind wing.
*b*¹. Fore wings very long, rather narrow, and slightly falcate at tips; hind wings as broad as, or broader than, the fore wings..... *Asotocerus*.
*b*². Fore wings broad, not falcate at tips; hind wings narrower than the fore wings..... *Ganonema*.

Anisocentropus magnificus Ulmer.

One from Los Baños. A black-winged species with a blue sheen to the fore wing and a hyaline oblique bar across middle.

Asotocerus umbrosus sp. nov. Plate II, fig. 18.

Yellowish brown; antennæ yellowish, plainly ringed with black at tips of the joints; legs yellowish. Wings very dark brown, costal area and along anal veins almost black; hind wings fully as dark. Vertex with a prominent, median, rounded depression, a little longer than broad, and rather broader behind than in front; posterior warts large, nearly reaching the eyes, and not their long diameter apart. Fore wing with venation as figured, strongly falcate at tip; in hind wings forks 2 and 3 are subequal, fork 1 as far back as origin of the pedicel of fork 3.

Expanse, 36 millimeters.

PALAWAN, Puerto Princesa (*Baker*).

LEPTOCERIDÆ

Key to the genera.

- a*¹. Discoidal cell in hind wings closed; fore wings extremely long. *Notanatolica*.
*a*². Discoidal cell in hind wings open.
*b*¹. Fork 2 in fore wing present..... *Triænodes*.

- b*². Fork 2 in fore wing absent.
- c*¹. In hind wings (which are very broad) the costal venation indistinct.
Leptocella.
- c*². In hind wings the costal venation as distinct as elsewhere.
- d*¹. Two spurs on front tibia; in female the median vein in fore wing twice branched beyond the anastomosis..... *Leptocerus*.
- d*². But one or no spurs to front tibia; in female (as in male) the median but one-branched beyond anastomosis.
- e*¹. Upper median of fore wing plainly forked at or near anastomosis.
- f*¹. Fore wings very broad; hind wings also rather broad; fore wings sparsely clothed with hair..... *Tagalopsyche*.
- f*². Fore wings as well as hind wings very slender; fore wings densely clothed with hair..... *Setodes*.
- e*². Upper median simple, the lower median forked at or near the anastomosis.
- g*¹. Subcosta and radius united above the discal cell.... *Æcetinella*.
- g*². Subcosta and radius not united..... *Æcetina*.

Leptocella bakeri Banks.

One, the type, from Los Baños.

Notanatomica magna Walk.

From Mount Maquiling.

Notanatomica opposita Walk.

Several from Mount Maquiling and Los Baños; both of these species are widely spread in this region.

Æcetinella confluens Ulmer.

Two from Los Baños. Described from Java.

Æcetina sp.

A broken specimen from Mount Maquiling.

Setodes apicipennis Banks.

One from Los Baños.

Tagalopsyche sisyroides Banks.

Two from Mount Maquiling and Los Baños.

HYDROPSYCHIDÆ

This family is usually divided into four families; however, three of them are very closely interwoven in structure, so it is better to use but two groups which I believe are not more than subfamilies.

Key to the subfamilies.

- a*¹. Antennæ much longer than fore wings; palpi often lacking; hind wings much broader than the fore wings..... *Macronematinae*.
- a*². Antennæ not as long as fore wings; palpi present; hind wings but little if any broader than fore wings..... *Hydropsychinae*.

MACRONEMATINÆ

Key to the genera.

- α^1 . Palpi lacking.
 b^1 . No median cell; discoidal cell very broad; venation peculiar. *Cestropsyche*.
 b^2 . Median cell present.
 c^1 . Discal all present, normal..... *Polymorphanisus*.
 c^2 . Discal all absent or abnormal..... *Cethaloptera*.
 α^2 . Palpi present.
 d^1 . Discal cell of fore wings closed..... *Macronema*.
 d^2 . Discal cell of fore wings open or lacking; some costal cross veins. *Amphipsyche*.

Cestropsyche vitrina Br.

Recorded from the Philippines; I have not received it.

Polymorphanisus semperi Br.

Described from the Philippine Islands; I have three from Mount Maquiling. A large, green caddice fly, the male with hyaline streaks in apex of wing.

Macronema bella sp. nov. Plate II, fig. 19.

Head, prothorax, two basal joints of the antennæ, all coxæ and femora, and the hind tibia nearly golden yellow; rest of the antennæ, front legs, and thorax black; rest of body and middle and hind tibia brown. Fore wings rich dark brown, with several clear, silvery white marks as in the figure; a sub-apical streak, two costal spots, tending to form a V, one behind, with a basal extension, a small costal mark toward base, another small median spot nearer base, and a double, oblique mark behind; the latter may be broken into two spots. Hind wings not quite as dark as the fore wings, with two white costal spots toward tip. Fore wings not very acute at tip and rather narrow; fork 1 with pedicel one half as long as discal cell, the latter twice as long as broad, and rather broader than the median, but latter one third longer. Venation black, except on the white spaces. Vertex with large, nearly circular anterior warts, not their diameter apart, posterior warts not one fourth as large, subtriangular; mesonotum polished. Male inferior appendages slender, apical part about as long as basal; barely clavate.

Expanse, 36 millimeters.

LUZON, Tayabas, Malinao (*Baker*).

HYDROPSYCHINÆ

Key to the genera.

- α^1 . Fork 4 of fore wings as long as fork 5, or fork 5 absent.
 b^1 . Fork 5 absent; spurs 3, 4, 4..... *Pseudoneureclipsis*.

- b*². Fork 5 present.
- c*¹. Ocelli present; a cross vein above end of discal cell.
- d*¹. Spurs 2, 4, 4; small species..... Echnopsyche.
- d*². Spurs 3, 4, 4; large species..... Stenopsyche.
- c*². Ocelli absent; no such cross vein.
- e*¹. Fork 1 absent in hind wings.
- f*¹. Spurs 3, 4, 4; fork absent in the wings..... Ecnomus.
- f*². Spurs 2, 4, 4; fork 3 present in hind wings..... Hydropsychodes.
- e*². Fork 1 present in both wings.
- g*¹. Antennæ crenulate beneath; abdomen with filament each side.
Diplectrona.
- g*². Antennæ not crenulate; no filament to the abdomen.
- h*¹. Female with mid tibiæ broadened; male with outer claw malformed or absent..... Hydropsyche.
- h*². Female with tibiæ normal; and male with claws normal.
Hydromanicus.
- a*². Fork 4 of fore wings shorter than fork 5, or fork 4 absent.
- i*¹. Ocelli present; fork 4 absent in fore wings; spurs 2, 4, 4.... Chimarra.
- i*². Ocelli absent; fork 4 present.
- j*¹. Spurs 3, 4, 4.
- k*¹. Discal cell in hind wings closed; fork 1 in hind wings present; pronotum rather long..... Dipseudopsis.
- k*². Discal cell in hind wings open; pronotum small.
- l*¹. Fork 1 in hind wings present..... Polycentropus.
- l*². Fork 1 in hind wings absent..... Polypsectropus.
- j*². Spurs 2, 4, 4; fork 1 absent in both wings; hind wings narrow.
- m*¹. Third joint of palpi longer than second..... Tinodes.
- m*². Third joint of palpi shorter than second..... Psychomyia.

Genus DIPSEUDOPSIS Walker

- a*¹. Wings rather clear, and all veins distinctly margined with brown.
nervosa.
- a*². Veins not distinctly margined with brown.
- b*¹. Male with a few short pale spots beyond anastomosis, none before; female pale, unmarked..... bakeri.
- b*². Male with elongate silvery spot beyond anastomosis, and one or more before luctuosa.

Dipseudopsis nervosa Br.

Described from the Philippine Islands; one from Los Baños.

Dipseudopsis luctuosa Banks.

From Los Baños and Mount Maquiling.

Dipseudopsis bakeri sp. nov. Plate II, figs. 20 and 21.

Brown; antennæ, palpi (except the last joint), legs, and venter yellowish. Wings brownish yellow, veins pale yellowish, the membrane with minute golden hairs; a hyaline white spot on origin of median fork and on cross vein obliquely back of it. Beyond anastomosis in the base of each cell including fork 1 to fork 4 is a pale, rather silvery spot, the middle pair elongate,

but all small; in one case one spot stretches along the lower border of fork 2; a pale elongate spot near end of anal vein, and one in the cell above it. Hind wings brownish, with the median fork and cross vein hyaline white. Venation very similar to that of *D. nebulosus*, the discal and median cells rather shorter than in that species, the wing beyond the anastomosis also a little shorter. In the female the color is more yellowish throughout, and in the fore wings there is no spot beyond the anastomosis.

Expanse, 27 millimeters.

LUZON, Laguna, Mount Maquiling and Los Baños (*Baker*).

At first I took this to be but a form of *D. nebulosus*, but with additional material, including males, it is seen to be very distinct; the form of the modified spur is very different from that of *D. nebulosus*.

Diplectrona cinctipennis Banks.

From Los Baños and Mount Maquiling; described as a *Hydromanicus*.

Hydromanicus fasciatus Ulmer.

One from Los Baños; also known from Java.

Hydropsychodes costalis Banks.

Two from Los Baños.

Echnopsyche reticulata Banks.

One, the type, from Los Baños.

Chimarra luzonica Banks.

One from Los Baños.

Polyplectropus sp.

One specimen, black-winged, dotted, with golden hairs.

Nyctiophylax tagalensis sp. nov. Plate II, fig. 22.

Brown; palpi yellowish brown; antennæ pale yellowish; gray hair between the antennæ, brown on the vertex; legs pale yellowish, the middle tarsi with dark marks. Abdomen dark in the middle, pale at base and tip. Wings yellowish gray, marked with brown, many short, fine, golden hairs; patches of brown at stigma, along costal, along anal margins, and over the cubital fork, and smaller ones elsewhere, especially along the outer margin and in region of the anastomosis; hind wings gray, darker at tips.

Expanse, 8 millimeters.

LUZON, Laguna, Mount Maquiling (*Baker*).

ILLUSTRATIONS

PLATE I

- FIG. 1. *Calopsocus rizali* sp. nov., fore wing.
2. *Calopsocus rizali* sp. nov., head.
3. *Myopsocus bakeri* sp. nov., fore wing.
4. *Epipsocus inornatus* sp. nov., fore wing.
5. *Epipsocus completus* sp. nov., wings.
6. *Amphipsocus connexus* sp. nov., fore wing.
7. *Amphipsocus unitus* sp. nov., fore wing.
8. *Kolbea bakeri* sp. nov., fore wing.
9. *Tagalopsocus luzonensis* g. et sp. nov., fore wing.
10. *Tagalopsocus luzonensis* g. et sp. nov., hind wing.

PLATE II

- FIG. 11. *Cæcilius castellus* sp. nov., wings.
12. *Cæcilius guttulatus* sp. nov., wings.
13. *Cæcilius inæqualis*, sp. nov., fore wings.
14. *Dypsocus apicatus* sp. nov., fore wing.
15. *Dypsocus apicatus* sp. nov., basal part of antenna.
16. *Myrmeleon angustipennis* sp. nov., pronotum.
17. *Distoleon bakeri* sp. nov., head and pronotum.
18. *Asotocerus umbrosus* sp. nov., fore wing.
19. *Macronema bella* sp. nov., wings.
20. *Dipseudopsis bakeri* sp. nov., genitalia.
21. *Dipseudopsis bakeri* sp. nov., spur.
22. *Nyctiophylax tagalensis* sp. nov., male genitalia.

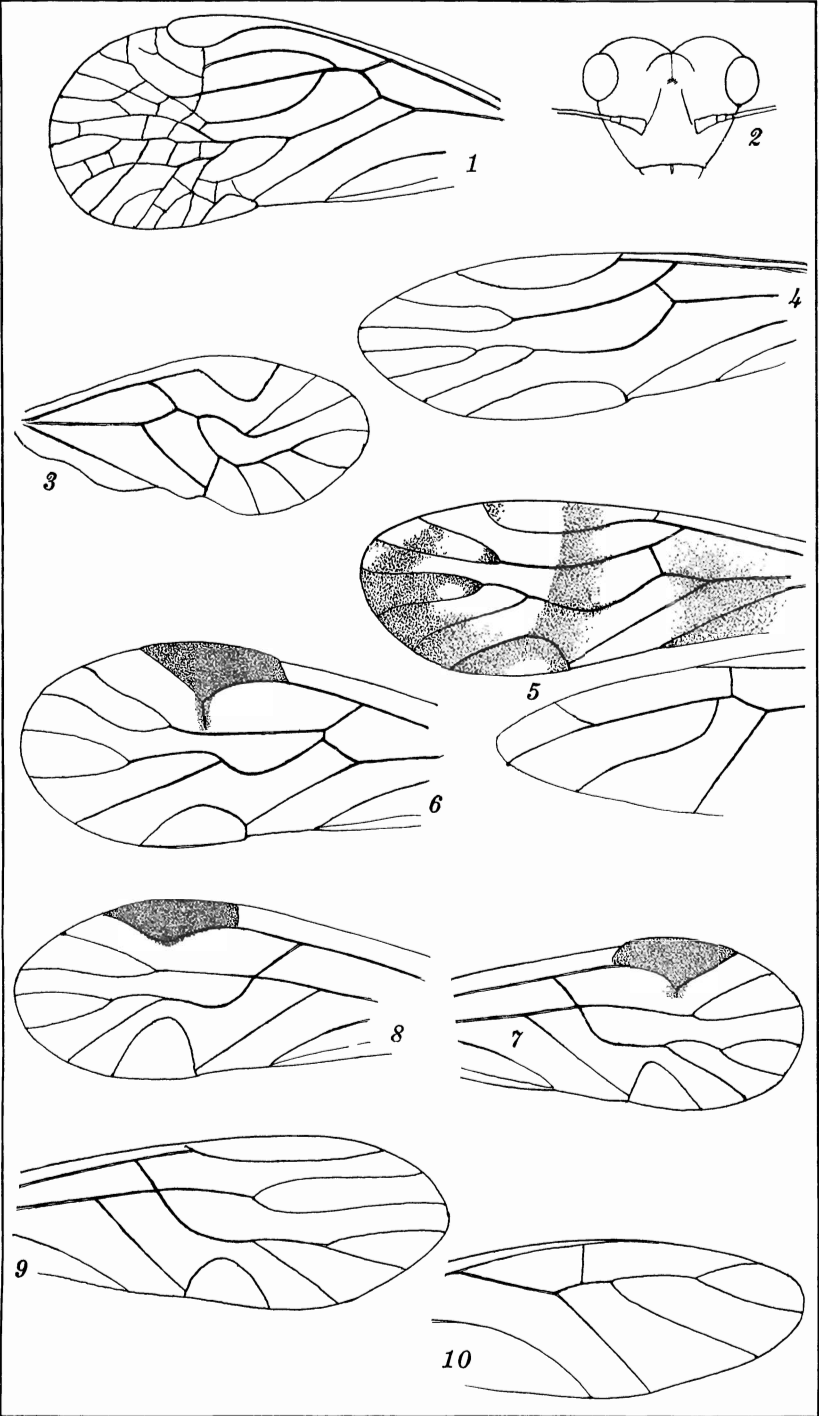


PLATE I. PHILIPPINE NEUROPTEROID INSECTS.

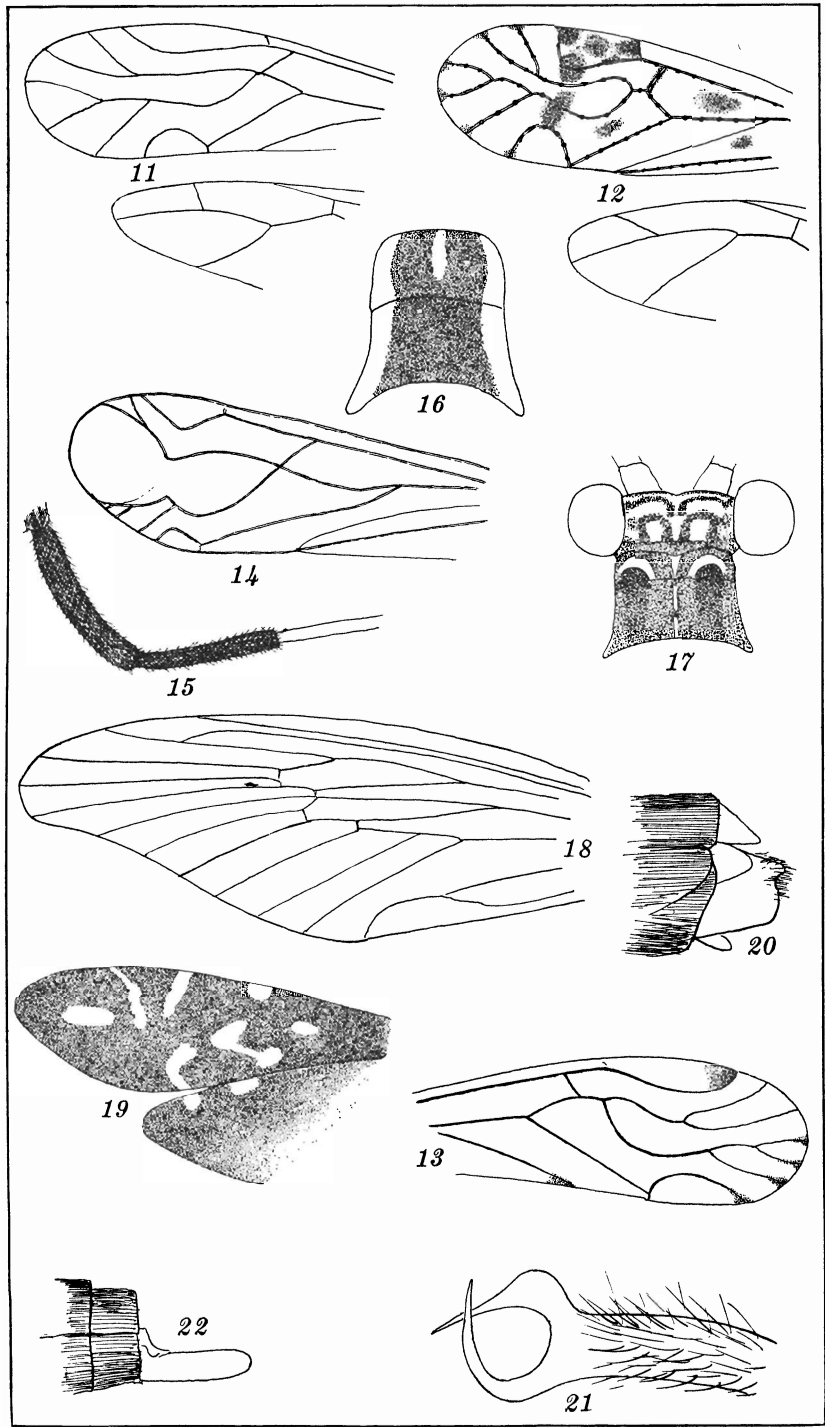


PLATE II. PHILIPPINE NEUROPTEROID INSECTS.